

B. Claims

Please replace all of the remaining claims in the application with the following complete set of claims.

1-19. (cancelled)

20. (new) A method of rotating an implement relative to a work machine, the work machine comprising an implement rotatable in at least first and second opposing directions, a mechanical stop mounted to the work machine which contacts the implement when the implement has rotated in the first direction to a first angular position, a hydraulic fluid cylinder mounted between the implement and the work machine for rotating the implement, and a valve for supplying hydraulic fluid to the hydraulic fluid cylinder, the method comprising:

receiving an operator input commanding rotation of the implement;

producing a valve signal responsive to the operator input;

receiving the valve signal and opening the valve responsive thereto to supply hydraulic fluid to the hydraulic fluid cylinder;

rotating the implement in the first direction under the force of the hydraulic fluid to an angular position beyond the first angular position; and

overriding an operator input commanding continued rotation of the implement in the first direction by producing a valve signal to close the valve and stop the rotation of the implement.

21. (new) A method according to claim 20 wherein the work machine further comprises a boom rotatably attached to a frame, the mechanical stop being mounted to the boom, the implement being rotatably attached to the boom, a first sensor for measuring the position of the boom relative to the frame, a second sensor for measuring the position of the implement relative to the frame, the method further comprising:

receiving the position of the boom relative to the frame from the first sensor;

receiving the position of the implement relative to the frame from the second sensor; and

detecting that the implement has rotated to an angular position beyond the first angular position by analyzing the position of the boom relative to the frame and the position of the implement relative to the frame.

22. (new) A method according to claim 21 wherein the method further comprises:

using the position of the boom relative to the frame and the position of the implement relative to the frame and a look up table to determine a scaling value;

modifying the operator input command in response to the scaling value; and

wherein the scaling value is approximately zero for combinations of boom positions and implement positions that correspond to the implement being rotated to an angular position beyond the first angular position.

23. (new) A work machine comprising:

a frame;

a first member rotatable relative to the frame;

a second member rotatable relative to the first member;

a first hydraulic cylinder operable to extend and retract and extending between the frame and the second member to power the rotation of the second member relative to the first member;

an electronic control module (ECM) which receives an operator input command for rotation of the second member, the electronic control module producing a valve signal in response to the operator input command;

a valve which receives the valve signal and is in fluid communication with the first hydraulic cylinder, the valve providing hydraulic fluid to power extension and retraction of the first hydraulic cylinder;

a mechanical stop located on the first member, the second member contacting the mechanical stop at a first angular position when the second member rotates in a first direction;

wherein the ECM permits operator input to move the second member in the first direction to the first angular position and beyond by producing a valve signal to rotate the second member in the first direction; and

wherein the ECM overrides operator input to move the second member in the first direction by producing a valve signal to stop continued rotation of the second member in the first direction after the second member has moved to a second angular position beyond the first angular position in the first direction.

24. (new) A work machine according to claim 23 wherein when the second member is moving in the first direction and is approaching the first angular position, the ECM modifies the operator input by producing a valve signal to rotate the second member at a rate slower than that called for by the operator input command.

25. (new) A work machine according to claim 24, the work machine further comprising:

a second hydraulic cylinder extending between the frame and the first member;

a first sensor for sensing the extension length of the first hydraulic cylinder;

a second sensor for sensing the extension length of the second hydraulic cylinder; and

wherein the ECM receives a first sensor signal from the first sensor and a second sensor signal from the second sensor.

26. (new) A work machine according to claim 25 wherein:

the ECM uses the first sensor signal and the second sensor signal and a look up table to determine a scaling value, with a discreet scaling value associated in the look up

table with each possible combination of first sensor signal values and second sensor signal values; and

the ECM modifies the operator input through the scaling value to produce a valve signal.

27. (new) A work machine according to claim 23, the work machine further comprising:

a second hydraulic cylinder extending between the frame and the first member;

a first sensor for sensing the extension length of the first hydraulic cylinder;

a second sensor for sensing the extension length of the second hydraulic cylinder; and

wherein the ECM receives a first sensor signal from the first sensor and a second sensor signal from the second sensor.

28. (new) A work machine according to claim 27 wherein:

the ECM uses the first sensor signal and the second sensor signal and a look up table to determine a scaling value, with a discrete scaling value associated in the look up table with each possible combination of first sensor signal values and second sensor signal values; and

the ECM overrides the operator input through an approximately zero scaling value to produce the valve signal to stop continued rotation of the second member.

29. (new) A method of rotating a bucket relative to a boom of a work machine, the bucket rotatable in at least first and second opposing directions, a mechanical stop mounted to boom which contacts the bucket when the bucket has rotated in the first direction to a first angular position, a hydraulic fluid cylinder operatively attached to the bucket for rotating the bucket relative to the boom, and a valve for supplying hydraulic fluid to the hydraulic fluid cylinder, the method comprising:

receiving an operator input commanding rotation of the bucket relative to the boom;

producing a valve signal responsive to the operator input;

receiving the valve signal at the valve and the valve opening responsive thereto to supply hydraulic fluid to the hydraulic fluid cylinder;

rotating the bucket in the first direction under the force of the hydraulic fluid to a second angular position beyond the first angular position; and

overriding an operator input commanding continued rotation of the bucket in the first direction by producing a valve signal to close the valve and stop the rotation of the bucket.